CONFIDENTIAL

50X1

16 May 1960

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Subject: Proposal and Quotation for Specification No. 60-A-1116-A

Dear [redacted] 50X1

[redacted] appreciates the opportunity to submit our proposed designs and quotations for two AC power supplies designated AP-3 and PS-10. 50X1

The following cost figures for the prototype units are based on our purchasing the individual parts in lots of ten (10).

Item I

Prototype AP-3 - Ten (10) units

| | |
|---|---|
| Engineering, Labor and Overhead | $ 9,137.00 |
| Model Shop Labor and Overhead | 250.00 |
| Material | 1,600.00 |
| Operating Expense | 636.00 |
| General Administrative Expense | 232.00 |
| Fixed Fee | 831.00 |
| Total | $12,686.00 |

Delivery of the first prototype unit for inspection and evaluation will be two months after receipt of order. Delivery of nine (9) units - three months after approval of first prototype.

Item II

Prototype PS-10 - Ten (10) units

| | |
|---|---|
| Engineering, Labor and Overhead | $ 9,137.00 |
| Model Shop Labor and Overhead | 250.00 |
| Material | 1,000.00 |
| Operating Expense | 612.00 |
| General Administrative Expense | 220.00 |
| Fixed Fee | 786.00 |
| Total | $12,005.00 |



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Item II (Cont'd)

Delivery of the first prototype unit for inspection and evaluation will be two months after receipt of order. Delivery of nine (9) units - three months after approval of first prototype.

Item III

Engineering drawings for Item I and II will consist of one (1) reproducible master set and two (2) copies.

| | |
|---|---|
| Drafting, Labor and Overhead | $ 2,820.00 |
| Operating Expense | 164.00 |
| General Administrative Expense | 60.00 |
| Fixed Fee | 213.00 |
| Total | $ 3,257.00 |

Delivery four (4) months after receipt of order.

Item IV

Instruction manuals for operation of the AP-3 and PS-10 combined in a single manual, a total number of twenty-five (25).

| | |
|---|---|
| Drafting, Labor and Overhead | $ 693.00 |
| Operating Expense | 40.00 |
| General Administratiwe Expense | 15.00 |
| Fixed Fee | 52.00 |
| Total | $ 800.00 |

Delivery five (5) months after receipt of order.

Total cost for Items I - IV - - - - - - - - - - - - - $28,748.00

Production quantities of the proposed design for either the AP-3 or PS-10 in lots of 100 units will be $310.00 per unit.

Terms are net 10th and 25th, F.O.B. our [redacted] This quotation is firm for 45 days. 50X1

Prices set forth herein do not include rental of Government furnished facilities. Rent-free-use of Government facilities provided under facilities contracts numbers AF33(038)-3203, AF33(600)-37367, AF33(600)-38793, and NOa-5725 is authorized for the performance of this contract. If the Seller is required to pay rental for such Government facilities or if such facilities are not available to the Seller, the price hereunder shall be adjusted to compensate Seller for such rental or non-availability of Governement facilities.

* continued *

We trust that the information submitted in this proposal interests you sufficiently to warrant your consideration of [redacted] 50X1
[redacted] as a source for your request for proposal. 50X1

If any questions should arise, please contact the writer at your earliest convenience.

Very truly yours,

[redacted] 50X1

Sales Representative

[redacted] 50X1

PROJECT

ER-4072

PROPOSAL FOR AN
AP-3 AND PS-10 POWER SUPPLY

50X1

| PREPARED BY: | CHECKED BY: | APPROVED BY: |
|---|---|---|
| | | |
| Development Engineer | Senior Project Engineer | Chief Engineer |
| | | |
| | | |
| | | |
| | | |

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DATE

May 16, 1960
fjc

DEPARTMENT

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## INTRODUCTION

The following proposal contains a description of a power supply designed to meet the performance requirements of the AP-3 and PS-10 supplies.

Included are a circuit discussion and a component description as well as photographs of similar [redacted] developed equipment. 50X1

With the proposed design, a low cost, light weight, portable unit is obtained which is capable of exceeding the performance requirements of the AP-3 and PS-10 power supplies.

## TECHNICAL DISCUSSION

Figure 1 is a schematic diagram of the proposed power supply. This schematic is the same for both the AP-3 and PS-10 power supplies.

Basically, the supply consists of a bridge rectifier, followed by an LC pi filter, terminated by a series type, transistor-Zener regulator.

The power transformer is a Silectron C-Core. This transformer has several low voltage primaries which are connected in series and parallel combinations by the voltage selector switch. Two secondaries are wound on the same core. One of these feeds 4 GE 2N1199, 12 amp silicon diodes connected in a bridge configuration. The other winding is a higher voltage winding which supplies d-c bias current for the Zener regulator by means of a full-wave rectifier and RC filter section.

Unfiltered, full-wave rectified d-c is available at the output of the bridge rectifier for the purpose of battery charging. An 0.5 ohm series

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TECHNICAL DISCUSSION (Continued)

limiting resistor is also provided for this purpose.

By means of the P1 filter, the input ripple is reduced to about 10%. Ripple reduction to ±1% and voltage regulation of ±5% is provided by the transistor-Zener regulator. A Motorola 2N1162, 25 amp, germanium power transistor is employed as the series regulating element. A 2N669 medium power germanium transistor is used as a current amplifier.

To provide a stable voltage reference, a 1 watt, 13.6 ±2% Zener reference diode is included. This Zener has a temperature coefficient of +0.04% per degree centigrade. For this reason, a forward biased silicon diode with a negative, voltage-temperature coefficient is placed in series with the Zener. In addition to this diode, the base to emitter diodes of the series regulating and current amplifying transistors exhibit a negative voltage-temperature coefficient. Hence, the transistor-Zener regulator is self-compensating with ambient temperature variations.

SIZE AND WEIGHT

The power supplies will be packaged in Zero, deep drawn instrument cases. A special 2 1/2" x 5" x 6" case will be used to house the AP-3 supply, while a standard 2 1/2" x 7" x 10" case will be employed for the PS-10 supply. Weights for the AP-3 and PS-10 supplies are 9.5 lbs. and 10.5 lbs. respectively. Figures 2 and 3 show similar equipment already developed by the [redacted] The type of housing shown in Figure 2 is 50X1 similar to that which is proposed for the AP-3 and PS-10 supplies.

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## SUMMARY

The power supplies described in the preceding discussion employ standard circuitry with small design refinements developed by the [redacted] Standard, available components are employed, thereby ensuring a reliable, low cost unit. 50X1

With the proposed design, a rugged, portable unit is obtained which is capable of exceeding the performance requirements for the AP-3 and PS-10 power supplies.

## ADDENDUM

Since the weight of 9.5 lbs. for the AP-3 supply is somewhat above the specification requirement, additional investigation was conducted after completion of the above proposal.

It appears that aluminum foil windings for the transformer and choke will result in a sizeable weight reduction. With this method of winding, the total weight of the AP-3 supply will be about 7 3/4 lbs.

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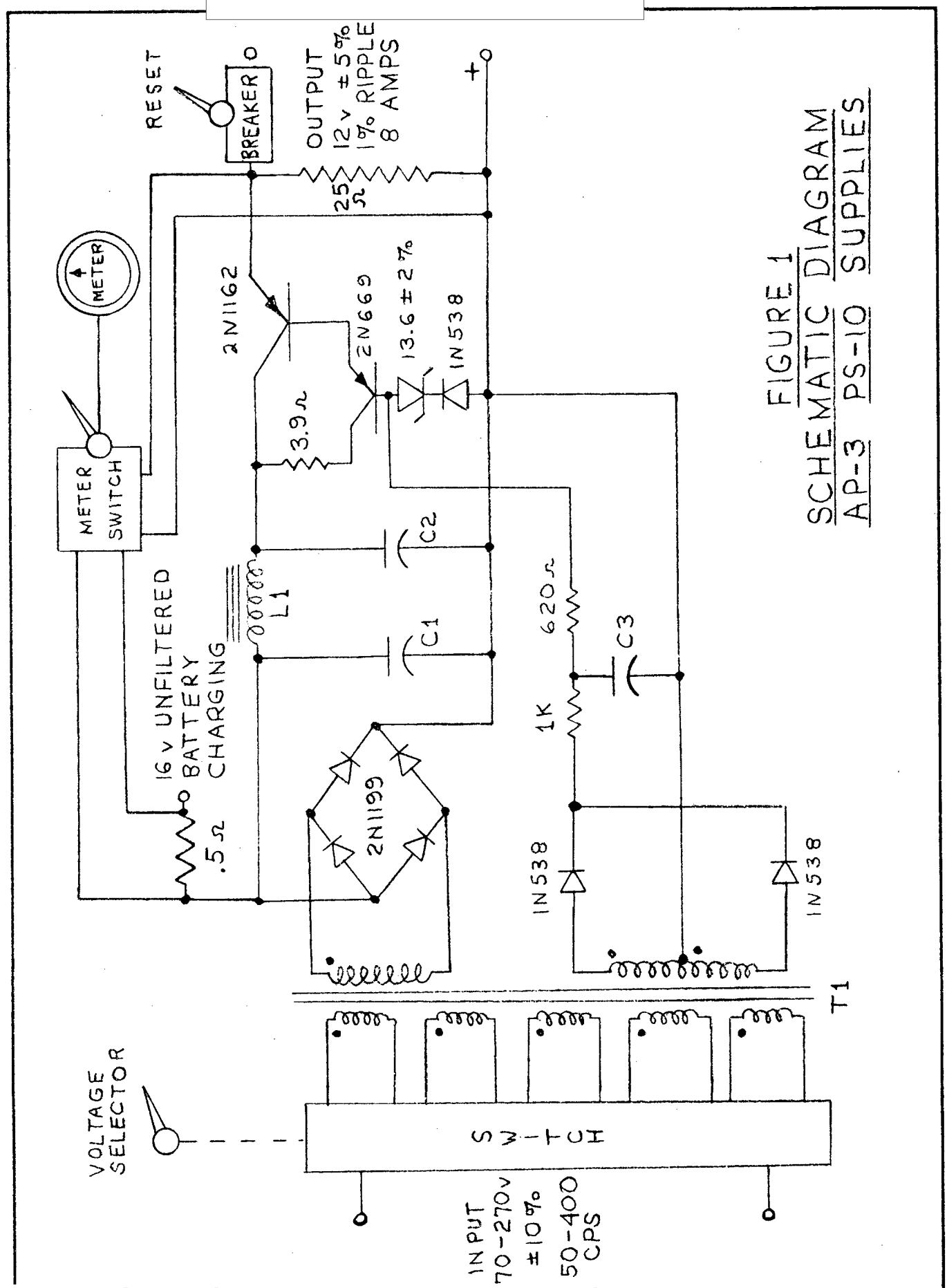
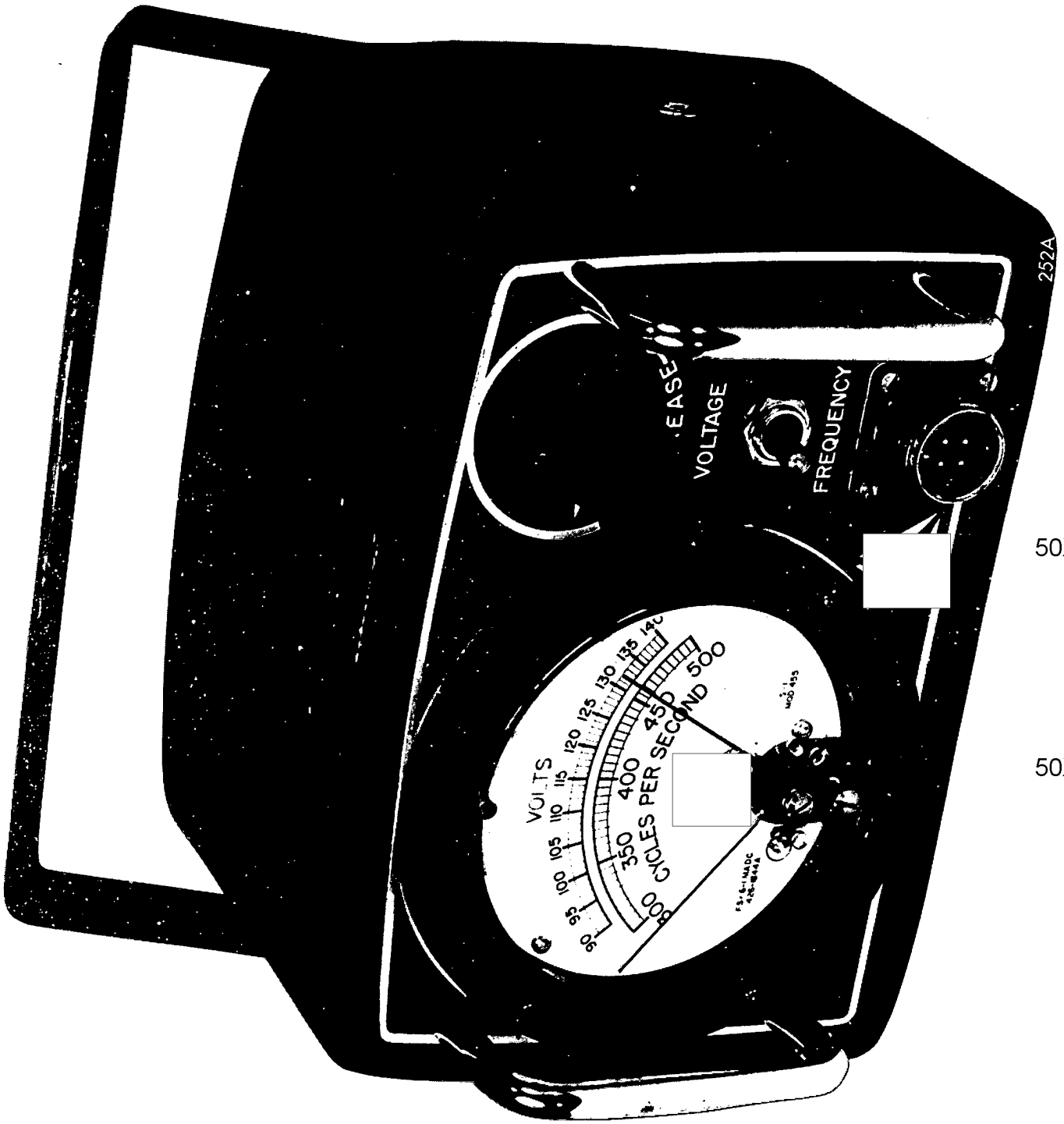



FIGURE 1
SCHEMATIC DIAGRAM
AP-3 PS-10 SUPPLIES




OVERSPEED TEST SET

FIGURE 2

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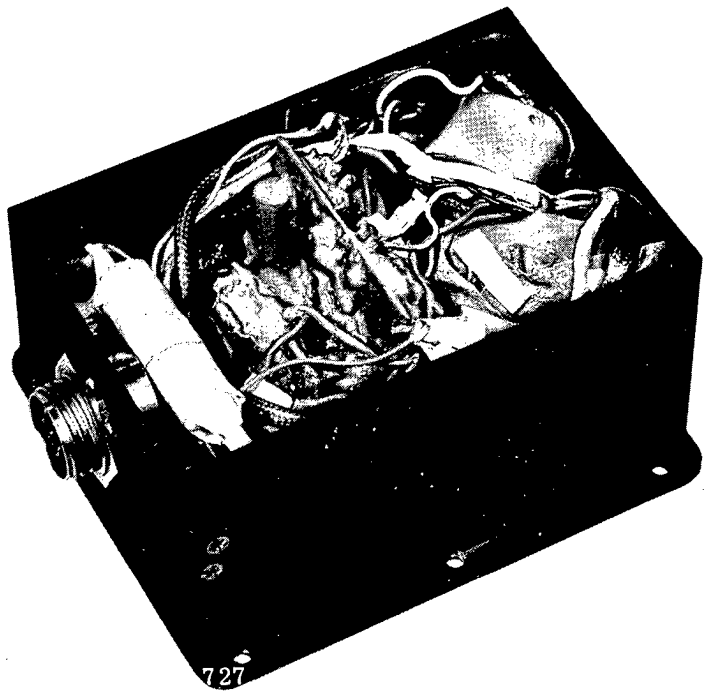


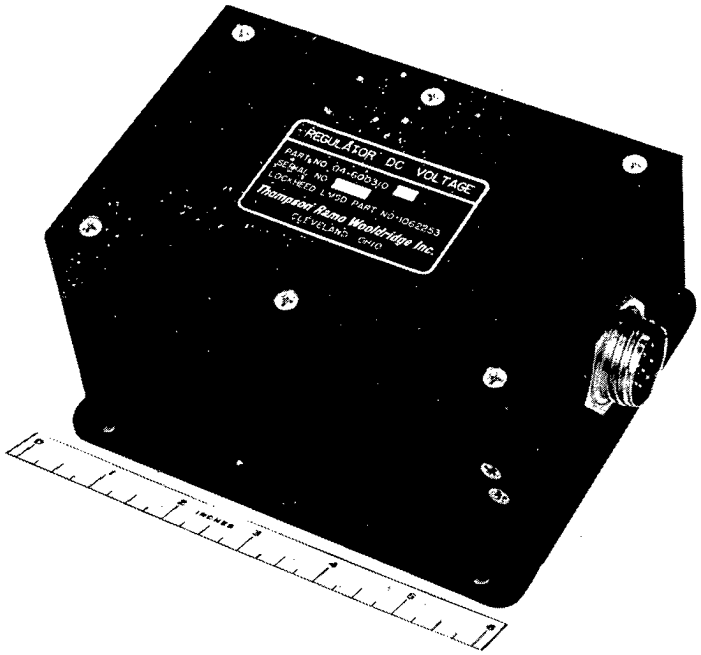


MAGNETIC D.C. VOLTAGE REGULATOR

FIGURE 3

## D.C. VOLTAGE REGULATOR

This regulator consists of a booster transformer, full wave controlled rectifier section and LC filter section connected in series. A stable internal d.c. reference and fast response magnetic amplifier provide the necessary control to maintain a constant output voltage.

## PERFORMANCE DATA

| | |
|---|---|
| Voltage Regulation (Under worst combination of load, environment, input power) | ± 0.7% |
| Input Voltage d.c. | 22 - 29.5 vdc |
| Output Voltage d.c. | 28.3 ± 0.7% |
| Input Voltage a.c. | 115 v ± 5%<br>2000 cps ± 1% |
| Output Power | 350 watts |
| Output Ripple | 15 mv peak to peak |
| Efficiency Full Load | 90% |
| Transient Protection | Will abosrb up to 46 volts peak at the d.c. input terminals. |
| Output Impedance | .02 ohms d.c.<br>2 ohms 10 cps to 40 kc |

## ENVIRONMENTAL DATA

| | |
|---|---|
| Vibration | 10g through 3000 cps |
| Shock | 40 g |
| Acceleration | 12g for 5 minutes |
| Temperature | -20°F to +165°F |

## PHYSICAL DATA

| | |
|---|---|
| Size | 3" x 4" x 6" |
| Weight | 5.3 lbs. |